



[Authoritative facts](#) about the skin from the [New Zealand Dermatological Society Incorporated](#).

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## Sunburn

### What is sunburn?

Sunburn is simply a burn or erythema (reddening) and oedema (swelling) on your skin from excessive exposure to the sun's rays, more specifically the ultraviolet (UV) radiation that is emitted from the sun. Sunburn may also occur from exposure to other UV light sources such as [solaria](#) or tanning salons.

At a cellular level, sunburn is associated with microscopic changes in the skin. There is the formation of UV induced sunburn cells and a reduction in Langerhan cells and mast cells, which play an essential part of the body's immune defence system.

### What causes sunburn?

To better understand the causes of sunburn we need to take a look at some basic principles of the electromagnetic (light) spectrum. This spectrum is divided according to wavelength into ultraviolet (<400nm), visible (400–760nm), and infrared (>760nm). The ultraviolet (UV) spectrum is further divided into 3 broad areas:

- Ultraviolet A (UV-A) = 320–400nm
- Ultraviolet B (UV-B) = 290–320nm
- Ultraviolet C (UV-C) = <290nm

UV-C radiation is filtered out or absorbed in the outer atmosphere so does not pose a problem to humans. It is UV-A and UV-B radiation that are the primary causes of sunburn. Although both wavelengths are implicated in sunburn, the skin reacts differently to each one.

### Reactions to UV-A and UV-B radiation

UV-A	UV-B
<p>Less potent than UV-B but is the wavelength that reaches the surface of the earth most (about 90% at midday)</p> <p>Also penetrates into the middle skin layer (dermis) and subcutaneous fat causing damage to the site where new skin cells are created</p> <p>Long-term exposure causes injury to the dermis resulting in ageing skin</p>	<p>Much more potent at causing erythema</p> <p>About 90% is absorbed by the surface skin layer (epidermis)</p> <p>Epidermis responds by releasing chemicals that cause the reddening and swelling characteristic of the early signs of sunburn</p> <p>Repeated exposure causes injury to the epidermis resulting in ageing skin</p>

### Who is at risk of sunburn?

Skin phototyping categorises people into one of six groups based on baseline skin colour and the tendency to tan and/or burn when exposed to UV radiation.

Skin Phototype	Typical Features	Tanning ability	MED (mJ/cm <sup>2</sup> )
I	Pale white skin, blue/hazel eyes, blond/red hair	Always burns, does not tan	15–30

II	Fair skin, blue eyes	Burns easily, tans poorly	25–40
III	Darker white skin	Tans after initial burn	30–50
IV	Light brown skin	Burns minimally, tans easily	40–60
V	Brown skin	Rarely burns, tans darkly easily	60–90
VI	Dark brown or black skin	Never burns, always tans darkly	90–150

People with type I skin phototyping are at much greater risk of sunburn than their type VI counterparts. The amount of UV radiation, measured in energy per unit area, to produce erythema at an exposed site is called the minimal erythema dose (MED) and this is significantly lower in people with a low skin phototype grading.

Other factors that increase the incidence of sunburn include:

- Regions situated closer to the equator
- Areas at high altitude – UV radiation increases 4% for every 300m increase in elevation
- Skin exposure between 10am and 2pm – 65% of UV radiation reaches the earth between these times
- Clear skies: clouds and environmental pollution reduce UV radiation
- Environmental reflection – UV radiation is 80% reflected by snow and ice

### What are the signs and symptoms of sunburn?

The signs and symptoms of sunburn differ for each individual according to their skin phototype and length of exposure to UV radiation. Fifteen minutes of midday sun exposure may cause sunburn in a white skin person, while a darker skinned person may tolerate the exposure for hours.

Signs and symptoms usually occur after 2–6 hours of exposure and peak at 12–24 hours, they may include:

- Erythema (redness)
- Oedema (swelling)
- Tenderness and/or irritation
- Skin feels hot to touch
- Pain
- Blistering (severe cases)
- Chills and fever (severe cases)

Around 4–7 days after exposure skin may start to peel and flake off.

In severe cases of sunburn, severe skin burning may result in second-degree burns, dehydration, electrolyte imbalances, secondary infection, shock or even death.

### Sunburn



## What is the treatment?

The treatment of sunburn is to provide relief of the discomfort it can cause. This can be achieved with the use of analgesics (pain-killers), cool baths, aloe vera lotions and moisturisers.

However, sunburn is better prevented than treated. Sun protection is your best defence against sunburn and other damaging effects of UV radiation.

- Avoid sun exposure, especially between 10am to 2pm
- Wear protective clothing, including wide-brimmed hats
- Regularly apply [sunscreen](#) with a Sun Protection Factor (SPF) of 30+

An oral food supplement containing [Polypodium leucotomas](#) may provide additional oral photoprotection and reduce sunburn.

If you are inadvertently exposed and expect to be sunburned:, you may lessen the severity of the burn with the following measures:

- Take two aspirin immediately and then two every four hours
- Apply a topical steroid to exposed areas twice daily for two or three days

## What are the long-term consequences?

It is now clearly apparent that the long-term consequences of overexposure to the sun or other sources of UV radiation are significant (click on links below for further information). One blistering sunburn is said to double the likelihood of developing skin cancer.

- Premature [ageing skin](#) and [wrinkling](#)
- [Brown spots and freckles](#) (lentigos)
- Development of premalignant lesions ([solar keratoses](#))
- Development of [skin cancer](#) (e.g. [melanoma](#), [basal cell carcinoma](#), [squamous cell carcinoma](#))

### Related information

#### References:

- Book: Textbook of Dermatology. Ed Rook A, Wilkinson DS, Ebling FJB, Champion RH, Burton JL. Fourth edition. Blackwell Scientific Publications.

#### On DermNet NZ:

- [Phototesting](#)
- [Ageing skin](#)
- [Sun protection](#)
- [Sun protective clothing](#)
- [Skin cancer](#)
- [Skin phototyping](#)
- [Thermal burns](#)

#### Other websites:

- [Sunburn](#): from Medline Plus
- [Ultraviolet radiation](#) – World Health Organization (WHO)
- [Sunburn](#) – emedicine dermatology, the online textbook
- [Sunburn](#) – emedicine Consumer Health

#### Books about skin diseases:

See the [DermNet NZ bookstore](#)

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DermNet does not provide an on-line consultation service.  
If you have any concerns with your skin or its treatment, see a [dermatologist](#) for advice.

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